CLAIMS

1. A micro-electromechanical system, comprising a substrate (S) as well as a first micro-element (1) and a second micro-element (2), wherein

   (a) the first micro-element (1) and the second micro-element (2) are connected to the substrate (S) and

   (b) the first micro-element (1) has a first face (3a) and the second micro-element (2) has a second face (4a), which faces (3a, 4a) face one another and are produced by a structuring method,

   characterised in

   (d) that the first micro-element (1) contains a switch section (5) by which it is bistably switchable between an initial position (A) and a working position (B), and

   (e) that the distance between the first face (3a) and the second surface (4a) in the working position (B) of the first micro-element (1) is smaller than a minimal distance producible by the structuring method between the first face (3a) and the second face (4a).

2. The micro-electromechanical system according to claim 1, characterised in

(a) that the first micro-element (1) has a first surface (3) which is the same as the first face (3a) or, if the first face (3a) is provided with a first coating (3b), is the same as the surface of this coating (3b) and

(b) that the second micro-element (2) has a second surface (4) which is the same as the second face (4a) or, if the second face (4a) is provided with a second coating (4b), is the same as the surface of this coating (4b).

3. The micro-electromechanical system according to claim 2, wherein

(a) the second micro-element (2) has a first fixed end (10) fixedly connected to the substrate (S) and a movable part (11),

characterised in

(b) that the first surface (3) and the second surface (4) are electrically non-conducting and

(c) that the first surface (3) and the second surface (4) have contact points in the working position (B) and

(d) that the second micro-element (2) is thereby switchable from a switch-off position (A') to a switch-on position (B'), that in the working position (B) of the first micro-

element (1) the movable part (11) of the second micro-element (2) is movable by electrostatic forces between the first micro-element (1) and the second micro-element (2).

4. The micro-electromechanical system according to claim 3, characterised in

(a) that the first micro-element (1) comprises an electrode (9), which electrode (9) contains the first surface (3) and

(b) that the electrode (9) and the second micro-element (2) are constructed such that in the switch-on position (B') of the second micro-element (2) the first surface (3) and the second surface (4) are in full-area contact.

5. The micro-electromechanical system according to claim 4, characterised in that the electrode (9) has a gap-forming surface (12) which is constructed such that it is set back in a step fashion with respect to the first surface (3) and with the second micro-element (2) encloses a gap (13) when the first micro-element (1) is in the working position (B) and the second micro-element (2) is in the switch-on position (B').

6. The micro-electromechanical system according to any one of claims 3 to 5, characterised in that the movable part (11) of the second micro-element (2) has a first region (14) and a second region (15), wherein the first region (14)

- is arranged between the second region (15) and the first fixed end (10) of the second micro-element (2),

- comprises a part of the second surface (4) and

- is constructed as less stiff than the second region (15).

7. The micro-electromechanical system according to any one of claims 3 to 5, characterised in

(a) that the micro-electromechanical system has two fixed contacts (17, 18) fixedly connected to the substrate, and

(b) that the movable part (11) of the second micro-element (2) has an electrically conductive contact region (16),

- which contact region (16) is arranged in the area of the end of the second micro-element (2) opposite to the first fixed end (10) of the second micro-element, and

- through which contact region (16) in the switch-on position (B') of the second micro-element (2) the two fixed contacts (17, 18) are interconnected in a conducting fashion.

8. The micro-electromechanical system according to claim 7, characterised in

(a) that the micro-electromechanical system comprises a third micro-element (1')

- which is bistably switchable,
- which is connected to the substrate (S) and
- which is arranged in a region which lies on the side of the second micro-element (2) facing away from the first micro-element (1) and

(b) that the micro-electromechanical system has two further fixed contacts (17', 18') which further fixed contacts (17', 18') are fixedly connected to the substrate and are arranged in a region which lies on the side of the second microelement (2) facing away from the fixed contacts (17, 18),

(c) that the movable part (11) of the second micro-element (2) has a further electrically conductive contact region (12') which is arranged in the area of an end of the second micro-element (2) opposite to the first fixed end (10) of the second micro-element (2), on the side of the second micro-element (2) facing away from the contact region (16), and

(d) wherein the third micro-element (1') interacts with the second micro-element (2) and with the further fixed contacts (17', 18') in a fashion similar to that in which

the first micro-element (1) interacts with the second micro-element (2) and with the fixed contacts (17, 18).

9. The micro-electromechanical system according to claim 6 and claim 7 or according to claim 6 and claim 8, characterised in

that the contact region (16) is arranged in the second region (15) of the movable part (11) of the second micro-element (2).

10. The micro-electromechanical system according to claim 1, characterised in

(a) that the micro-electromechanical system comprises a third micro-element (1') which

- is connected to the substrate (S) and
- has a third face (3a'),

(b) that the second micro-element (2) contains a switch section which has

- a first fixed end (10) fixedly connected to the substrate (S),
- a second fixed end (10') fixedly connected to the substrate (S),
- a movable part (11) arranged between these two fixed ends (10, 10') and

- a fourth face (4a')

and

(c) through which switch section the second micro-element (2) is switchable between a switch-off position (A') and a switch-on position (B'),

wherein

(d) the movable part (11) of the second micro-element (2) comprises an electrically conductive contact region (16),

(e) the second face (4a) is arranged between the first fixed end (10) and the contact region (16), and

(f) the fourth face (4a') is arranged between the second fixed end (10') and the contact region (16),

(g) the third face (3a') and the fourth face (4a') are produced by the structuring method and are facing one another, and

(h) that the third micro-element (1') contains a switch section through which it is bistably switchable between an initial position (A) and a working position (B), and

(i) that the distance between the third surface (3a') and the fourth face (4a') in the working position (B) of the third micro-element (1') is smaller than a minimal distance producible by the structuring method between the third face (3a') and the fourth face (4a').

11. The micro-electromechanical system according to claim 10, characterised in

(a) that the third micro-element (1') has a third surface (3') which is the same as the third face (3a') or, if the third face (3a') is provided with a third coating (3b'), is the same as the surface of this coating (3b'), and

(b) that the second micro-element (2) has a fourth face (4') which is the same as the fourth face (4a') or, if the fourth face (4a') is provided with a fourth coating (4b'), is the same as the surface of this coating (4b').

12. The micro-electromechanical system according to claim 11, characterised in

(a) that the micro-electromechanical system contains two fixed contacts (17, 18) fixedly connected to the substrate (S),

(b) that the second micro-element (2) is thereby switchable from its initial position (A') into its switch-on position (B'), that in the working position (B) of the first micro-element (1) and of the third micro-element (1') the movable part (11) of the second micro-element (2) is elastically movable by electrostatic forces between the first microelement (1) and the second micro-element (2) and between the third micro-element (1') and the second micro-element (2), and

(c) that in the switch-on position (B') of the second micro-element (2) the two fixed contacts (17, 18) are interconnected by the contact region (16) in a conducting fashion.

13. The micro-electromechanical system according to claim 12, characterised in

(a) that the micro-electromechanical system comprises

- a fourth micro-element (19) and

- a fifth micro-element (20)

(b) which micro-elements (19, 20)

- are connected to the substrate (S) in an area which lies on the side of the second micro-element (2) facing away from the fixed contacts (17, 18),

- contains switch sections through which they are bistably switchable between an initial position (A) and a working position (B), and

- which each have a contact electrode (21, 22) provided with an electrically conductive coating, and

(c) that in the switch-off position (A') of the second micro-element (2) in the working position (B) of the fourth microelement (19) and the fifth micro-element (20) the two contact electrodes (21, 22) are interconnected by the contact region (16) in an electrically conducting fashion.

14. The micro-electromechanical system according to any one of claims 10 to 13, characterised in that the second micro-element (2) is bistably elastically switchable between its initial position (A') and its switch-on position (B').

15. The micro-electromechanical system according to claim 14, characterised in

(a) that the micro-electromechanical system comprises

- a sixth micro-element (23) and

- a seventh micro-element (24),

(b) which micro-elements (23, 24)

- are connected to the substrate (S),

- are arranged on the side of the second micro-element (2) which is facing away from the second surface (4) and the fourth surface (4'),

- contain switch sections through which they are bistably switchable between an initial position (A) and a working position (B),

(c) that the sixth micro-element (23) has a fifth face (25a),

(d) that the second micro-element (2) has a sixth face (26a) which is arranged on the side of the second micro-element (2) facing away from the second surface (4) between the first fixed end (10) and the contact region (16),

(e) wherein the fifth face (25a) and the sixth face (26a) are facing one another and are produced by the structuring method,

(f) that the seventh micro-element (24) has a seventh face (25a'),

(g) that the second micro-element (2) has an eighth face (26a') which is arranged on the side of the second micro-element (2) facing away from the fourth surface (4') between the second fixed end (10') and the contact region (16),

(h) wherein the seventh face (25a') and the eighth face (26a') are facing one another and produced by the structuring method, and

(i) that the distance between the fifth face (25a) and the sixth face (26a) in the working position (B) of the sixth micro-element (23) is smaller than a minimal distance producible by the structuring method between the fifth face (25a) and the sixth face (26a), and

(i) that the distance between the seventh face (25a') and the eighth face (26a') in the working position (B) of the seventh micro-element (24) is smaller than a minimal distance producible by the structuring method between the seventh face (25a') and the eighth face (25a', 26a') and

(j) that the second micro-element (2) is thereby switchable from its switch-on position (B') into its switch-off position (A'), that in the working position (B) of the sixth micro-element (23) and the seventh micro-element (24) the movable part (11) of the second micro-element (2) is elastically movable by electrostatic forces between the sixth micro-element (23) and the second micro-element (2) and between the seventh micro-element (24) and the second micro-element (2).

16. The micro-electromechanical system according to any one of claims 14 or 15, wherein

(a) the substrate (S) is constructed as a flat extensive solid with a principal surface, and

(b) the micro-elements (1, 1', 2, 19, 20, 23, 24) are constructed as regular prismatic bodies whose base surfaces are aligned parallel to the principal surface, characterised in

(c) that the movable part of the second micro-element (2)

- is constructed as a regular prismatic body and

- is laterally movable and

(d) that the base surface of the regular prismatic body forming the movable part (11)

either

- has the form of a symmetrical antinode in the switch-off position (A') and

- has the form of an asymmetric antinode in the switch-on position (B'),

or

- describes two parallel cosinusoidal lines which are interconnected at the centre (8) between their two ends (6, 7).

17. The micro-electromechanical system according to any one of claims 1 to 16, wherein

(a) the substrate (S) is constructed as a flat extensive body with a principal surface and

(b) the micro-elements (1, 1', 2, 19, 20, 23, 24) are constructed as regular prismatic bodies whose base surfaces are aligned parallel to the principal surface, characterised in

(c) that there is at least one micro-element (1, 1', 2, 19, 20, 23, 24) bistably switchable between an initial position (A) and a working position (B), whose switch section contains

- a first fixed end fixedly connected to the substrate (S),

- a second fixed end fixedly connected to the substrate (S) and

- a movable part arranged between these two fixed ends,

(d) which movable part

- is constructed as a regular prismatic body and

- is laterally movable and

(e) that the base surface of the regular prismatic body forming the movable part

either

- has the form of a symmetrical antinode in the switch-off position (A') and

- has the form of an asymmetric antinode in the switch-on position (B'),

or

- describes two parallel cosinusoidal lines which are interconnected at the centre (8) between their two ends.

18. The micro-electromechanical system according to claim 3, characterised in that

the movable part (11) of the second micro-element (2) is elastically deformable from the initial position A to the working position A by switching the first micro-element (1).

19. The micro-electromechanical system according to claim 18, characterised in

(a) that the micro-electromechanical system has two fixed contacts (17, 18) fixedly connected to the substrate and

(b) that the movable part (11) of the second micro-element (2) has an electrically conductive contact region (16),

- which contact region (16) is arranged in the area of an end of the second micro-element (2) opposite to the first fixed end (10) of the second micro-element (2) and

- through which contact region (16) in the switch-off position (A') of the second-microelement (2) the two fixed contacts (17, 18) are interconnected in a conducting fashion.

20. The micro-electromechanical system according to any one of claims 1 to 9 or 18 or 19, wherein

(a) the substrate (S) is constructed as a flat extensive body with a principal surface, characterised in

(b) that the switch section (5) of the first micro-element (1) is horizontally movable and

(c) that the movable part (11) of the second micro-element (2) is horizontally movable.

21. A method for manufacturing a micro-electromechanical system in which method

(a) a first micro-element (1) connected to the substrate is produced from a substrate (S) and

(b) a second micro-element (2) connected to the substrate is produced from a substrate, and

(c) using a structuring method, a first face (3a) of the first micro-element (1) and a second face (4a) of the second micro-element (2) are formed which faces (3a, 4a) face one another and are at a distance from one another,

characterised in

(d) that the first micro-element (1) is formed such that

- it is located in an initial position (A),
- it is bistably switchable from the initial position (A) into a working position (B) and
- the distance of the first face (3a) from the second face (4a) in the working position (B) is smaller that a minimal distance producible by the structuring method between the first face (3a) and the second face (4a) and

(e) that after forming the first face (3a) and the second face (4a) by the structuring method, the first micro-element (1) is switched into the working position (B).

22. The method of manufacture according to claim 21, characterised in that before switching the first micro-element (1) into the working position (B), the first face (3a) of the first micro-element (1) is provided with a first electrically conducting or electrically non-conducting coating (3b),

and/or

the second face (4a) of the second micro-element (2) is provided with a second electrically conducting or electrically non-conducting coating (4b).

23. The method of manufacture according to any one of claims 21 to 22, characterised in that one of the electro-mechanical systems is manufactured according to any one of claims 1 to 20.